“A STUDY TO COMPARE THE EFFECTIVENESS OF PILATES VS BACK EXERCISES IN ADOLESCENTS WITH NON SPECIFIC LOW BACK ACHE”

DISSERTATION SUBMITTED TO

THE TAMILNADU DR. M.G.R MEDICAL UNIVERSITY TOWARDS

PARTIAL FULFILLMENT AS A REQUIREMENT

FOR THE DEGREE

MASTER OF PHYSIOTHERAPY

(ADVANCED PHYSIOTHERAPY IN ORTHOPAEDICS)

APRIL - 2011

CERTIFICATE

This is to certify that the research work entitled **"A STUDY TO COMPARE THE EFFECTIVENESS OF PILATES VS BACK EXERCISES IN ADOLESCENTS WITH NON SPECIFIC LOW BACK ACHE"**.

Was carried out by (Reg.No.27092901) Thanthai Roever College of Physiotherapy, towards partial fulfillment as a requirement for the degree Master of physiotherapy in ortho Submitted to The Tamilnadu Dr. M.G.R Medical University, Chennai for the session April - 2011.

Prof. FREDRICK JOHN, M.P.T.,M.I.A.P.,

Principal,

Thanthai Roever College of Physiotherapy,

Perambalur - 621212.

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Mr. EBENEZER , M.P.T., M.I.A.P.,

Guide,

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Perambalur - 621212.

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Examiners:

1.

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CONTENTS

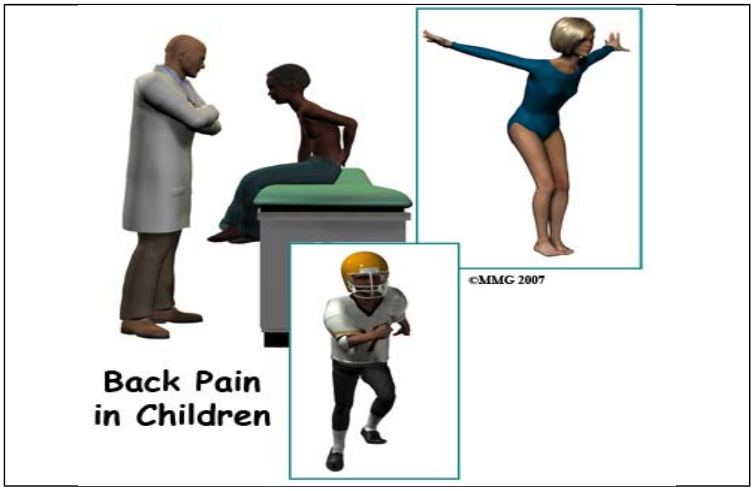
1. INTRODUCTION

1.1 LOW BACK PAIN:

Back pain (also known as “Dorsalgia”) is pain felt in the back that usually originates from the muscles, nerves, bones, joints or other structures in the spine. Low back pain (referred to generally as Lumbago) is a common symptom of musculo- skeletal disorders or of disorders involving the lumbar vertebrae and related soft tissue structures such as muscles, ligaments, nerves and intervertebral discs.

Low back pain is common during adolescence. Poor posture, inappropriate forms of exercise and carrying heavy school bags are some of the causes of back pain in young people.

Adolescent back pain poses a distinct diagnostic challenge to the Physician due to skeletal maturity and activity levels seen in adolescent patients. A significant increase in back pain incidence occurred at the age of 12 years and over. In all age groups above 11 years, more than 50 percent had experienced back pain at some time in their life. For adolescents who had previously experienced back pain, there was a significant risk identified for future occurrence. [11]



1.2 AETIOLOGY OF ADOLESCENT LOW BACK PAIN:

Some of the many potential influences in the development of back pain in children include:

- **Gender:** Back pain is more common in females.
- **Age:** Children at 12 years and over experience significantly more back pain than younger children.
- **Obesity and poor posture**
- **Heavy school bags** carried on one shoulder or in one hand.
- **Incorrectly packed backpacks.**
- **Sedentary life style** such as watching a lot of television or sitting in front of the computer.
- **Injuries** caused by vigorous sports like foot ball or horse riding, flexibility dependent sports such as gymnastics or dance, and power sports such as weight lifting or rowing.
- **Soft Tissue injuries** such as strains and sprains.
- **Competitive sports** that demand intense training. It is thought that tight muscles can trigger low back pain.

Medical Conditions that can cause back pain in children:

- **Injuries to bones & joints:** Compression fractures & Disc injuries.

- **Fibromyalgia** causes back and neck pain in adolescents with associated muscle spasm & fatigue.

- **Sciatica:** Compression of sciatic nerve.

- **Scheuermann's disease:** a growth disorder of the vertebrae which may produce a hump back curvature (kyphosis).

- **Idiopathic Scoliosis**: Sideways curvature of the spine with an unknown cause.

- **Spondylosis**: a congenital structural defect in the vertebrae.

- **Spondylolisthesis**: a condition characterized by unstable vertebrae as a consequence of a pre-existing spondylosis.

- **Tumours or Infection**: rare cause, least likely cause of back pain is Adolescents.

1.3 NEED FOR STUDY:

DEBBIE EHRMANN FELDMANN et al, 2001 stated that a previous history and earlier onset of low back pain are associated with chronic low back pain in adults implying the prevention in adolescence may have a positive impact in adulthood. Students who had low back pain at age 14 were more likely to have back pain 25 years later than students who didn't have it.

Decreased muscle flexibility and trunk strength have been postulated as risk factors for non specific low back pain.

In recent years more subtle stresses i.e. static and faulty postures are the usual root of back trouble. Today's lifestyle, more than any other in history, creates an insidious strain on the back, stressing the soft tissue and predisposing them to injury, ***Mc KENZIE, 1987.***

Many teenagers have "Mechanical low back pain". This is often related to tight hamstrings and weak abdominal muscles. These individuals seem to do well with a physical therapy program stressing hamstring stretching and abdominal strengthening.

Exercises are critical for strong muscles and bones. Exercises help kids lower their risk of chronic pain in the future.

The more flexible men and women are as teenagers, the lower their risk of neck and back tensions in the future, according to a study published in the ***FEBRUARY 2006, BRITISH JOURNAL OF SPORTS MEDICINE.***

Sedentary living is probably a primary non medical cause contributing to back pain.

Lack of exercise leads to the following conditions that may threaten the back:

- **Muscle inflexibility** restricts the back's ability to move, rotate and bend.

- **Weak stomach muscles** increase the strain on the back and can cause an abnormal tilt of the pelvis.

- **Weak back muscles** increase the load on the spine and the risk of disc compression.

- **Obesity** puts more weight on the spine and increases pressure on the vertebrae and discs.

Appropriate back care while sitting, standing, lifting objects, and lying helps to prevent undue stress on the low back. Studies of LBP in the adolescent age group are of particular importance, as back pain that occur initially during this time may fore shadow the subsequent, severe, chronic morbidity seen in adulthood, ***OLSEN et al 1992; BALAGUE et al, 1998.***

OLSEN et al, 1992 reported that 30 percent of the adolescent population experienced LBP at some point in their lives. The study published by chartered society of physiotherapy reported that as many as 48.5 percent of secondary pupils in U.K. already have some form of pain caused by their lifestyles.

There are few studies about adolescent low back in India. According to the literatures, it is important to prevent and treat LBP in adolescents. Increasing muscle flexibility and

trunk strength through back exercises and appropriate back care helps to reduce the adolescent non-specific low back pain.

This comparative study helps to know the effect of back exercises with back care and back care alone in adolescents with non-specific low back pain.

1.4 STATEMENT OF PROBLEM:

Though pilates and back exercises both have been proven to benefit people for non specific low back ache, yet to be delineated regarding the efficacy. Clarity of conclusion could be reached as combined study has not been recorded so far. Hence the study aims to examine whether is two approaches causes a difference in outcomes in reducing low back ache.

1.5 AIM AND OBJECTIVE:

To compare the effectiveness of pilates versus back exercises of in the adolescents with non-specific low back ache.

1.6 NULL HYPOTHESIS (H_0):

There is no significant improvement in pain and functional ability in adolescents with non-specific low back ache.

1.7 ALTERNATE HYPOTHESIS (H_1):

There is significant improvement in pain and functional ability in adolescents with non-specific low back pain.

1.8 OPERATIONAL DEFINITIONS:

Low back ache:

It is a common symptom of musculoskeletal disorders or of disorders involving the lumbar vertebrae and related soft tissue structures such as muscles, ligaments, nerves and intervertebral discs.

Pain:

It is a typical sensory experience that may be described as the unpleasant awareness of a noxious stimulus.

Functional disability:

A functional concept of disability, defines a disability as any long term limitation in activity resulting from a condition or health problem.

2. REVIEW OF LITERATURE

KIM HJ AND GREEN DW (2008) concluded that increasing numbers of active adolescents will lead to increasing complaints of back pain seen by the primary care physician. Recent epidemiological studies have suggested a correlation between adolescent back pain and adult-onset back pain.[1]

RICHARDS BS AND Mc CARTHY RE (1999) reviewed that a variety of disorders can account for back pain in the child or adolescent. Fortunately, nearly all can be correctly diagnosed by taking a thorough medical history, performing a complete physical examination, and obtaining appropriate imaging and laboratory studies.[2]

MASIERO S et al (2008) concluded that a total of 1180 (20.5 percent) teenagers reported one or more episodes of LBP, of whom 900 (76.3 percent) had consulted a health provider.[3]

AHLQWIST A, HAGMAN M, et al (2008) concluded that an individual assessment by a knowledgeable physiotherapist and an active treatment model improve how children and adolescents experience their back problems with respect to health and physical function, pain, strength and mobility regardless of whether treatment consist of a home exercise program with follow-up or home exercise combined with exercise and treatment supervised by a physiotherapist.[4]

BOCKOWSKI L et al (2007) said that some school age children suffering from low back pain particularly with sciatic neuralgia symptoms seek medical care in hospital.[5]

MACIAS BR, MURTHY G et al (2008) concluded that when walking with the back pack straps over both shoulders, contact pressures were significantly greater in the low back condition.[6]

CLARE HASELGROVE et al (2008) stated that neck pain is as common as back pain amongst adolescents. Perceived school bag load, duration of carriage and method of transport to school are associated with back and neck pain.[7]

SKOFFER B, FOLDSPANG A (2008) stated that LBP can be correlated with physical inactivity.[8]

***ELIZABETH CANDY, RICHARD WATTS (2004*)** concluded that a change in seating position appears to reduce back pain in school students.[9]

BERNSTEIN RM, COZEN H (2007) stated that if non specific back pain is suspected, treatment may include home-based exercise, physical therapy or non-steroidal anti-inflammatory drugs.[10]

HESTBACK L et al (2006) demonstrated the correlations between low back pain in child-hood/adolescence and low back pain in adulthood.[11]

DEBBIE EHRMANN FELDMAN et al (2001) stated that a high growth spurt decreased quadriceps and hamstrings flexibility, smoking and low mental health status were associated with low back pain development in adolescents.[12]

***KAREN GRIMMER et al (2002*)** recommended that adolescents position the centre of a typical school back pack at approximately waist level, and that they actively reduce their back pack loads to minimize postural displacement.[14]

KATHLEEN PRENDEVILLE and SARA DOCKRELL (1998) stated that LBP does occur in adolescence and that it has an effect on the lives of those who suffer from it.[15]

BURTON, A KIM; CLARKE, ROBERT D (1996) concluded that back pain in adolescents is common, it increases with age and is recurrent, but in general does not deteriorate with time.[16]

GARETH T JONES, KATH D WATSON (2003) stated that in children who are initially free of LBP, adverse psychosocial factors and the presence of other pre-existing somatic pain symptoms were predictive of future LBP, reflective findings in adults.[17]

G KRISTJANSDOTTIR, H RHEE (2007) stated that overall four major factors (age, morning tiredness, eating habits and parental support) emerged as factors associated with back pain in study subjects.[18]

G KRISTJANSDOTTIR (1996) stated that the prevalence of back pain experienced in a nation-wide random sample of 2173 Icelandic school children aged 11 – 12 and 15 – 16 is 20.6 percent with at-least weekly back pain.[19]

MA JONES, G STRATTOM (2005) concluded that hip range of motion, abdominal muscle endurance, lumbar flexibility and lateral flexion of the spine were risk indicators for recurrent non-specific low back pain in a group of adolescents.[20]

SMITH A, O SULLIVAN P (2008) identified significant associations between posture sub-groups and weight, height, body mass index and gender. More neutral thoraco-lumbo- pelvic postures are associated with less back pain.[21]

DEBBIE EHRMANN FELDMANN et al, 2001 stated that a previous history and earlier onset of low back pain are associated with chronic low back pain in adults implying the prevention in adolescence may have a positive impact in adulthood. Students who had low back pain at age 14 were more likely to have back pain 25 years later than students who didn't have it. [22]

In recent years more subtle stresses i.e. static and faulty postures are the usual root of back trouble. Today's lifestyle, more than any other in history, creates an insidious strain on the back, stressing the soft tissue and predisposing them to injury, ***Mc KENZIE, 1987.***[23]

The more flexible men and women are as teenagers, the lower their risk of neck and back tensions in the future, according to a study published in the ***FEBRUARY 2006, BRITISH JOURNAL OF SPORTS MEDICINE.*** [24]

Studies of LBP in the adolescent age group are of particular importance, as back pain that occur initially during this time may fore shadow the subsequent, severe, chronic morbidity seen in adulthood, ***OLSEN et al 1992; BALAGUE et al, 1998.*** [25]

OLSEN et al, 1992 reported that 30 percent of the adolescent population experienced LBP at some point in their lives. The study published by chartered society of physiotherapy reported that as many as 48.5 percent of secondary pupils in U.K. already have some form of pain caused by their lifestyles. [26]

3. METHODOLOGY

3.1 STUDY DESIGN : Experimental

3.2 SETTING : Clinical

3.3 POPULATION : Female subjects in the range of 14 to 19 years with a history of non-specific low back ache.

3.4 SAMPLE SIZE : 30 Subjects

3.5 SAMPLING TECHNIQUE : Simple random sampling technique

Criteria:

3.6 INCLUSION CRITERIA:

- Female subjects with a history of non-specific low back ache.
- Age group between 14-19 years.

3.7 EXCLUSION CRITERIA:

- History of Neurological/ Vascular/ Orthopaedic disorders
.
- Any recent injuries.
- Subjects who are psychologically depressed.
- Recent surgeries.

- Recent fractures.
- Subjects with specific low back ache.
- Male subjects with history of non-specific low back ache.

3.8 VARIABLES:

Independent variables:

- Back exercises [26]
- Pilates [27]

Dependent variables:

- Pain [25]
- Functional disability [13]

3.9 TOOLS:

- Visual pain scale [25]
- Oswestry disability index [13]

3.10 PROCEDURE:

Thirty subjects fulfilling the inclusion criteria are chosen for the treatment. They received the visual and verbal instructions about the treatment program.

MEASUREMENT OF VARIABLES:

Pre-treatment measurement:

Subjects were evaluated for the following before the commencement of the treatment program:

- Pain Score [25]
- Oswestry Disability Index [13]

Pain Score:

The amount of pain experienced by the subject is assessed by Visual pain scale. On the Visual pain scale, the pain score is recorded on a scale calibrated from 0 to 10, where no distress is recorded as 0 and unbearable distress as 10.[25]

Functional disability:[13]

Functional disability is measured by OSWESTRY DISABILITY INDEX. The subject is asked to answer the questions in the Oswestry disability index by choosing the best answer that describes his/her typical pain and/ or limitations within the last week or two.

% disability = point total / 50 * 100

ODI Scoring :

0 – 20 % - Minimal disability

21 – 40 % - Moderate disability

41 – 60 % - Severe disability

61 – 80 % - Crippled

81 – 100 % - Bed bound patients.

Treatment Program:

The subjects chosen for the treatment program were given practice instructions on how to do the pilates and to do back exercises. The subjects chosen are categorized into two groups. Group I includes fifteen subjects who were instructed to do the pilates. Group II includes fifteen subjects who were instructed to follow the back exercises.

The subjects performing pilates were instructed on the technique to follow while doing the exercises. Correct techniques of back exercises were also taught to the subjects. Any variations in the techniques were not encouraged.

The subjects were instructed to do the exercises twice daily 7 days a week for 4 weeks. The subjects were reviewed once in a week to record the pain, and functional disability.

Pilates:

The Plank Abdominal Exercise:

Begin in the plank position with your forearms and toes on the floor. Keep your torso straight and rigid and your body in a straight line from ears to toes with no sagging or bending. Your head is relaxed and you should be looking at the floor. Hold this position for 10 seconds to start. Over time work up to 30, 45 or 60 seconds.

Side Plank Hip Strengthening Exercise:

Begin by lying on your side on the floor. Position your elbow on the floor just under your shoulder. Lift up on that elbow and keep your body stiff from head to toe. Hold this position for a count of 10 and lower your hip to the floor. Rest and repeat three times. Switch sides and repeat the exercise on the other hip. You can increase the effect of this exercise by lifting the top leg up toward the ceiling. Repeat the leg lift 10 times slowly and return to the start position.

Bridge Exercise:

Lay on your back with your hands by your sides, your knees bent and feet flat on the floor. Make sure your feet are under your knees. Tighten your abdominal and buttock muscles. Raise your hips up to create a straight line from your knees to shoulders. Squeeze your core and try to pull your belly button back toward your spine. If your hips sag or drop, lower yourself back on the floor. The goal is to maintain a straight line from your shoulders to your knees and hold for 20 to 30 seconds. You may need to begin by holding the bridge position for a few seconds as you build your strength. It's better to hold the correct position for a shorter time than to go longer in the incorrect position.

Superman Exercise:

Lie face down on a mat with your arms stretched above your head (like superman). Raise your right arm and left leg about 5-6 inches off the ground (or as far as you comfortably can). Hold for 3 seconds and relax. Repeat with the opposite arm and leg.

Quadruped Exercise:

Kneel with both knees and both hands flat on the floor (Starting Position). Simultaneously raise one arm and the opposing leg to the horizontally outstretched position and hold for the desired time period (Finishing Position). Return back to the starting position and repeat with the opposing arm and leg.

Back Exercises:[26]

Muscle stretching is an important part of the healing process for tightened muscles of the back. It is essential to lengthen any shortened muscular tissue of the back to help prevent further pulling on the already shortened fibers. Back strengthening exercises help to build stability to weak tissue.

The exercises below are general exercises to increase flexibility and can help to stabilize the back.

Back Flexion Stretch:

The subject is asked to lie on the back and both knees are pulled to the chest while simultaneously flexing the head forward until a comfortable stretch in a balled-up position is reached. 8 – 12 repetitions are done holding each one for 8 – 10 seconds at a time.

Back Extension Exercise:

The subject is asked to lie on the stomach and the chest is pushed up with both hands simultaneously while keeping the pelvis flat against the floor. The back is pushed up until a comfortable stretch in the extended position is reached. 8 – 12 repetitions are done holding each one for 8 – 10 seconds at a time.

Hamstring Stretch:

The subject is asked to sit on the ground with one leg straight and the other one comfortably bent in front of the body. Lean forward while bending at the waist keeping the back as straight as possible. The arms are reached towards the foot until a stretch is felt under the thigh. The stretch is held for a minimum of 30 seconds and 3 repetitions are done.

Piriformis Stretch:

The subject is asked to lie on the back, bending the right leg and pulling up the right knee towards the opposite chest with the left hand. The stretch is felt in piriformis portion of the right buttocks. The exact opposite is done to achieve a stretch on the left piriformis portion of the buttocks. The stretch is held for 30 seconds and 3 repetitions are done.

Quadriceps Stretch:

The subject is asked to stand holding a solid surface for support and bend back the left leg. The left ankle is grabbed and the foot is pulled to the left buttocks while simultaneously pulling the left thigh backwards with back straight. The stretch is held for a minimum of 30 seconds and 3 repetitions are done.

4. ANALYSIS AND INTERPRETATION OF DATA / GRAPHS

4.1 STATISTICAL METHOD:

The collected data were tabulated and analyzed by using descriptive and interferential statistics. The data was analyzed by paired t-test. The Statistical package for social sciences (SPSS) package was used to calculate and analyze the above mentioned descriptive and inferential statistics.

1. To assess all parameters descriptive statistics like mean and standard deviation were used.

- **Mean:**

$$\bar{d} = \frac{\sum d}{n},$$

Where $\sum d$ is the summation of difference

n is the no of samples

- **Standard Deviation:**

$$SD = \sqrt{\left(\frac{\sum d^2}{n}\right) - \left(\frac{\sum d}{n}\right)^2},$$

Where d is difference between pre and post treatment values

n is no of samples

2. To find the changes that occurred in the same group during study measure of inferential statistics called paired 't' test was used.

- **'t' test formula:**

$$t = \frac{\bar{d}}{\left(\frac{s}{\sqrt{n-1}}\right)},$$

Where $\bar{d}$ is Mean of Samples

s is Standard Deviation

$\sqrt{n-1}$ is Degrees of Freedom

The calculated values t – values is then compared with standard tabulated t a n-1 value where a is the level of significance which is usually maintained at 95%.

4.2 TABULATIONS AND INTERPRETATIONS:

Table 1 : Descriptive statistics for pain score and functional disability grade for Group I (Pilates) pre and post treatment.

S.No	Parameters	No. of Samples	MEAN		Mean Difference	SD	
			Pre	Post		Pre	Post
1	Pain Score	15	5.25	1.50	3.75	0.96	0.58
2	Functional Disability grade	15	15.00	6.50	8.50	2.58	1.00

Interpretation:

The descriptive studies (Mean, Mean difference and standard deviation) for the pain score and functional disability grade for Group 1 pre and post treatment are shown in the above table.

Table 2 : Descriptive statistics for pain score and functional disability grade for Group II (Back exercises) pre and post treatment.

S.No	Parameters	No. of Samples	MEAN		Mean Difference	SD	
			Pre	Post		Pre	Post
1	Pain Score	15	4.25	3.00	1.25	1.26	0.82
2	Functional Disability grade	15	13.50	10.50	3.00	2.52	2.52

Interpretation:

The descriptive studies (Mean, Mean difference and standard deviation) for the pain score and functional disability grade for Group II pre and post treatment are shown in the above table.

Table 3 : Comparative statistics (Paired 't' test values) for pain score between Group I and Group II (Pre and Post treatment).

S.No	Group	No. of Samples	Pain gain Score		't' Value	'p' Value
			Mean	SD		
1	I	15	3.75	0.96	4.63	0.004 **
2	II	15	1.25	0.50		

Note: ** denotes significant at 1% level.

*** denotes significant at 5% level.**

Interpretation:

Based on the paired ‘t’ test values and ‘p’ values, at 1% level of significance, there is significant difference between pre & post treatment for pain score between Group I and Group II.

Table 4 : Comparative statistics (Paired ‘t’ test values) for functional disability between Group I and Group II pre and post treatment.

S.No	Group	No. of Samples	Pain gain Score		‘t’ Value	‘p’ Value
			Mean	SD		
1	I	15	8.50	3.42	3.05	0.022 *
2	II	15	3.00	1.15		

Note: ** denotes significant at 1% level.

*** denotes significant at 5% level.**

Interpretation:

Based on the paired 't' test values and 'p' values, at 5% level of significance, there is significant difference between pre & post treatment for functional disability grade between Group I and Group II.

4.3 DATA ANALYSIS:

- The Mean, Mean difference and Standard Deviation for the pain score and functional disability grade for Group I pre (0 week) and post (4 weeks) treatment are shown in Table 1.

- The Mean, Mean difference and Standard Deviation for the pain score and functional disability grade for Group II pre (0 week) and post (4 weeks) treatment are shown in Table 2.

- The paired 't' test values and 'p' values for pain score between Group 1 and Group 2 are shown in Table 3.

- The paired 't' test values and 'p' values for functional disability grade between Group 1 and Group 2 are shown in Table 4.

- Analysis for table 3 and table 4 was done using paired ‘t’ tests. The level of significance was calculated from ‘p’ values between the groups.

5. RESULTS

- The Mean, Mean difference and standard deviation for pain score and functional disability grade between pre and post treatment for Group I (Pilates) are recorded in table 1. Analysis of the data shows that there is significant reduction in pain score and functional disability grade pre and post treatment programs.

- The Mean, Mean difference and standard deviation for pain score and functional disability grade between pre and post treatment for Group II (Back exercises) are recorded in table 2. Analysis of data shows that there is reduction in pain score and functional disability grade pre and post treatment programs.

- The comparison of significance of reduction in the pain score and functional disability grade between pre and post treatment programs for Group I and pre and post treatment programs for Group II was done with paired 't' test values.

- The comparison of the significance of pain gain score and functional disability grade gain score between Group I and Group II are recorded in tables 3 and 4. Analysis of the data shows that there is a significant reduction in pain and functional disability in group I when compared with group II.

- The graphical representation of the means of pain score and functional disability grade between the pre and post treatment programs in Group I and Group II are represented in graphs 1, 2, 3 , 4, 5, & 6 respectively.

- There was significant reduction in pain and functional disability between pre and post treatment programs in Group I when compared with Group II.

6. DISCUSSION

AHLQWIST A et al reported that LBP among children and adolescents has increased.[4] The literature shows that children with LBP suffer form this condition later in adulthood. Thus it is important to prevent and treat LBP in adolescents.

SKOFFER B, FOLDSPANG A (2008) stated that LBP can be correlated with physical inactivity.[8] Research on back pain in children and adolescents has been minimal **(MC GRATH 1990)** as the disorder in this age group was previously thought to be rare.

In recent years, more subtle stresses, i.e. static and faulty postures are the usual root of back trouble. Decreased muscle flexibility and trunk strength have been postulated

as risk factors for low back pain. Tight hamstrings and weak abdominal muscles are related to mechanical low back pain.

The objective of the study is to compare the effect of pilates and back exercises in reducing pain and functional disability in adolescents with non-specific LBA.

Back exercises improve the strength of muscles, bones and ligaments. Spinal mobility is improved.

ROBERT J DUAL (2005) concluded that stretching and strengthening of the muscles around the back aid in pain relief by helping take stress off the low back and hips and may greatly reduce the advancement of low back pain.[22]

Proper postural care while lifting, sitting, standing, lying helps to reduce stress on spinal structures.

JOHN SCHUBHE, DC (2004) stated that not maintaining good posture and adequate back support can add strain to muscles and put stress on the spine.[23]

JEANNE MARKUSIC stated that bad posture can be the cause of spinal pain, it can make existing pain worse and it certainly can make the pain last a lot longer.[24]

In this study, pilates were followed by Group I and back exercises alone by Group II.

The results indicated that the pilates is more effective in reducing pain and functional disability when compared with back exercises alone in adolescents with non-specific low back ache.

7. CONCLUSION

The results of the study indicated that the pilates is more effective than back exercises alone for reducing pain and functional disability in adolescents with non-specific low back ache.

8. LIMITATIONS / SUGGESTIONS

LIMITATIONS:

- The subjects were not randomized depending on the severity.
- Subjects without any recent injuries are taken up for the study.
- The study was confined to adolescent girls with non-specific low back ache.
- Subjects who were psychologically depressed were not taken for the study.

SUGGESTIONS:

- A similar study can be conducted in individuals with poor spinal flexibility.

- A still wider study can be conducted to get more reliable results covering a group representing a wider population.
- The above study can be done as a preventive measure to prevent adolescent non-specific low back ache risks and complications.
- A similar study can be done in adolescent males also.

9. REFERENCES

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10. APPENDICES

10.1 APPENDIX A

ASSESSMENT CHART

NAME :

AGE :

GENDER :

SUBJECT NO. :

ADDRESS :

DATE :

PARAMETERS :

- **Pain score** :
- **Functional disability** :

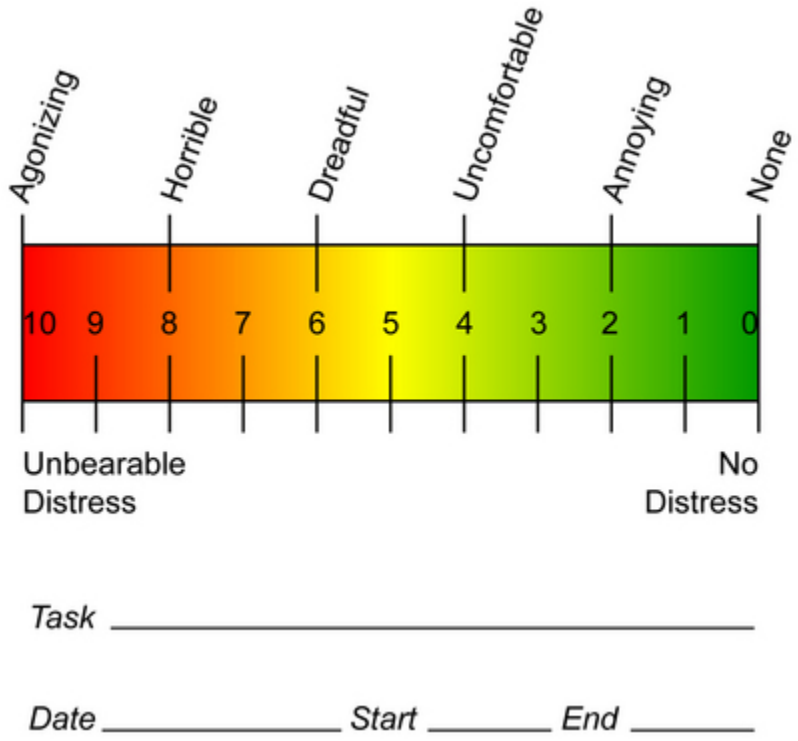
TESTS :

- **Straight leg raising (SLR)** :

10.2 APPENDIX B

VISUAL PAIN SCALE

The amount of pain experienced by the subject is assessed by Visual pain scale. The pain score is recorded on a scale calibrated from 0 to 10, where no distress is recorded as 0 and unbearable distress is recorded as 10. The subject is asked to identify how much pain they are having by choosing a number from 0 to 10.



10.3 APPENDIX C

OSWESTRY DISABILITY INDEX

The Oswestry Disability Index (aka: Oswestry Low Back Pain Disability Questionnaire) is an extremely important tool that researchers and disability evaluators use to measure a patient's permanent functional disability. The test has been around for 25 years and is considered the "gold standard" of low back functional outcome tools.

INSTRUCTIONS:

The subject is asked to answer the below questions by choosing the best answer that describes his/her typical pain and/ or limitations with in the last week or two. Only one answer is chosen. If the limitations fall in between two questions, pick the higher point value question. After finishing the test add up the points, divide that number by 50 and multiply by 100 to get the percent disability.

OSWESTRY DISABILITY INDEX 2.0

Section 1: Pain Intensity

I can tolerate the pain I have without having to use pain killers. [0 points]

The pain is bad but I manage without taking pain killers. [1 point]

Pain killers give complete relief from pain. [2 points]

Pain killers give moderate relief from pain. [3 points]

Pain killers give very little relief from pain. [4 points]

Pain killers have no effect on the pain and I do not use them. [5 points]

Section 2: Personal Care

I can look after myself normally without causing extra pain. [0 points]

I can look after myself normally but it causes extra pain. [1 point]

It is painful to look after myself and I am slow and careful. [2 points]

I need some help but manage most of my personal care. [3 points]

I need help every day in most aspects of self care. [4 points]

I do not get dressed wash with difficulty and stay in bed. [5 points]

Section 3: Lifting

I can lift heavy weights without extra pain. [0 points]

I can lift heavy weights but it gives extra pain. [1 point]

Pain prevents me from lifting heavy weights off the floor but I can manage if they are conveniently positioned for example on a table. [2 points]

Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned. [3 points]

I can lift only very light weights. [4 points]

I cannot lift or carry anything at all. [5 points]

Section 4: Walking

Pain does not prevent me walking any distance. [0 points]

Pain prevents me walking more than 1 mile. [1 point]

Pain prevents me walking more than 0.5 miles. [2 points]

Pain prevents me walking more than 0.25 miles. [3 points]

I can only walk using a stick or crutches. [4 points]

I am in bed most of the time and have to crawl to the toilet. [5 points]

Section 5: Sitting ("Favorite chair" includes a recliner.)

I can sit in any chair as long as I like. [0 points]

I can only sit in my favorite chair as long as I like. [1 point]

Pain prevents me sitting more than 1 hour. [2 points]

Pain prevents me from sitting more than 0.5 hours. [3 points]

Pain prevents me from sitting more than 10 minutes. [4 points]

Pain prevents me from sitting at all. [5 points]

Section 6: Standing (Remember, standing is NOT walking.)

I can stand as long as I want without extra pain. [0 points]

I can stand as long as I want but it gives me extra pain. [1 point]

Pain prevents me from standing for more than 1 hour. [2 points]

Pain prevents me from standing for more than 30 minutes. [3 points]

Pain prevents me from standing for more than 10 minutes. [4 points]

Pain prevents me from standing at all. [5 points]

Section 7: Sleeping

Pain does not prevent me from sleeping well. [0 points]

I can sleep well only by using tablets. [1 point]

Even when I take tablets I have less than 6 hours sleep. [2 points]

Even when I take tablets I have less than 4 hours sleep. [3 points]

Even when I take tablets I have less than 2 hours of sleep. [4 points]

Pain prevents me from sleeping at all. [5 points]

Section 8: Sex Life (by pain = for fear of causing pain)

My sex life is normal and causes no extra pain. [0 points]

My sex life is normal but causes some extra pain. [1 point]

My sex life is nearly normal but is very painful. [2 points]

My sex life is severely restricted by pain. [3 points]

My sex life is nearly absent because of pain. [4 points]

Pain prevents any sex life at all. [5 points]

Section 9: Social Life

My social life is normal and gives me no extra pain. [0 points]

My social life is normal but increases the degree of pain. [1 point]

Pain has no significant effect on my social life apart from limiting energetic interests such as dancing. [2 points]

Pain has restricted my social life and I do not go out as often. [3 points]

Pain has restricted my social life to my home. [4 points]

I have no social life because of pain. [5 points]

Section 10: Travelling

I can travel anywhere without extra pain. [0 points]

I can travel anywhere but it gives me extra pain. [1 point]

Pain is bad but I manage journeys over 2 hours. [2 points]

Pain restricts me to journeys of less than 1 hour. [3 points]

Pain restricts me to short necessary journeys less than 30 minutes. [4 points]

Pain prevents me from traveling except to the doctor or hospital. [5 points]

10.4 APPENDIX D

INFORMED CONSENT TO PARTICIPATE VOLUNTARY IN A RESEARCH INVESTIGATION

Department of Physical Therapy,

Thanthai Hans Roever College of Physiotherapy

Perambalur, Tamilnadu.

Name :

Age :

Sex :

Occupation :

Address :

Declaration

I have fully understood the nature and purpose of the study. I accept to be a subject in this study. I declare that the above information is true to my knowledge.

Signature of the subject

Date :

Place :